WHAT IS CLAIMED IS:

1   1.   An image processing device comprising:

2   a first element which produces partial straight lines from a straight line, wherein

3   one of vertical or horizontal coordinate values of each of said partial straight lines has

4   the same value;

5   a second element which produces, based on said partial line produced by said

6   first element, a shading range having a first and second end, wherein said first end has

7   a first color and said second end has a second color;

8   a third element which converts said first and second color of said shading range

9   to a third and a fourth color, which express brightness as an independent parameter;

10   and

11   a fourth element which produces, by using said third and fourth color, color of

12   respective pixels between said first end and said second end of said shading range,

13   wherein said color of respective pixels changes smoothly from said first end to said

14   second end.

1   2.   The image processing device as claimed in claim 1,

2   wherein said first element produces a first partial straight line in which each

3   point of said first partial straight line has a first horizontal coordinate value and a

4   second partial straight line in which each point of said second partial straight line has a

5   second horizontal coordinate value;

6   wherein the difference between said first horizontal coordinate value and said

7   second horizontal coordinate value is a pixel;

8   wherein the smallest vertical coordinate of said second partial straight line is one

9   pixel larger than the largest vertical coordinate of said first partial straight line; and

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10   wherein said second element produces said shading range so that said shading

11   range is adjacent to said first partial straight line in a horizontal direction and is

12   adjacent to said second partial straight line in a vertical direction.

1   3.   The image processing device as claimed in claim 2, wherein the length of said

2   shading range is the same as that of said first partial straight line.

1   4.   The image processing device as claimed in claim 2, further comprising a frame

2   buffer which stores information about said first partial straight line, said second partial

3   straight line and said shading range.

1   5.   The image processing device as claimed in claim 2, wherein said shading range

2   has a starting point, which has the smallest vertical coordinate and which has a color of

3   a pixel located at said starting point, and a ending point, which has the largest vertical

4   coordinate and has same color as the partial straight line associated with said shading

5   range.

1   6.   The image processing device as claimed in claim 1,

2   wherein said first element produces a first partial straight line in which each

3   point of said first partial straight line has a first vertical coordinate value and a second

4   partial straight line in which each point of said second partial straight line has a second

5   vertical coordinate value;

6   wherein the difference between said first vertical coordinate value and said

7   second vertical coordinate value is a pixel;

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8   wherein the smallest horizontal coordinate of said second partial straight line is

9   one pixel larger than the largest horizontal coordinate of said first partial straight line;

10   and

11   wherein said second element produces said shading range so that said shading

12   range is adjacent to said first partial straight line in a vertical direction and is adjacent

13   to said second partial straight line in a horizontal direction.

1   7.   The image processing device as claimed in claim 6, wherein the length of said

2   shading range is the same as that of said first partial straight line.

1   8.   The image processing device as claimed in claim 6, further comprising a frame

2   buffer which stores information about said first partial straight line, said second partial

3   straight line and said shading range.

1   9.   The image processing device as claimed in claim 6, wherein said shading range

2   has a starting point, which has the smallest horizontal coordinate and which has a color

3   of a pixel located at said starting point, and a ending point, which has the largest

4   horizontal coordinate and has same color as the partial straight line associated with

5   said shading range.

1   10.   The image processing device as claimed in claim 1, wherein said third element

2   converts said first and second color of said shading range to a third and a fourth color

3   which is expressed in YUV color space.

1   11.   The image processing device as claimed in claim 1, wherein said third element

2   converts said first and second color of said shading range to a third and a fourth color

3   which is expressed in YIQ color space.

1   12.   The image processing device as claimed in claim 1, wherein said fourth element

2   produces color changing smoothly from said first end to said second end by performing

3   linear interpolation.

1   13.   An image processing device comprising:

2   a first element which produces partial straight lines, each of which is parallel to

3   one of a vertical or a horizontal line, from a line;

4   a second element which separates a color brightness parameter of each of said

5   partial straight lines; and

6   a third element which produces ranges locating adjacent to said partial straight

7   lines, respectively, and makes the color of each of said ranges change smoothly from

8   the starting point to the ending point by using said brightness parameter.

1   14.   The image processing device as claimed in claim 1, further comprising:

2   a frame buffer; and

3   a fourth element which writes a predetermined one or plurality of said partial

4   straight lines to said frame buffer; and

5   wherein said third element writes said ranges to said frame buffer.

1   15.   An image processing method comprising:

2   producing partial straight lines from a straight line, wherein one of vertical or

3   horizontal coordinate values of each of said partial straight lines has the same value;

4   producing, based on said partial line, a shading range having a first and second

5   end, wherein said first end has a first color and said second end has a second color;

6   converting said first and second color of said shading range to a third and a

7   fourth color, which express brightness as an independent parameter; and

8   producing, by using said third and fourth color, color of respective pixels existing

9   between said first end and said second end of said shading range, wherein said color

10   changes smoothly from said first end to said second end.

1   16.   The image processing method as claimed in claim 15,

2   wherein a first partial straight line in which each point of said first partial straight

3   line has a first horizontal coordinate value and a second partial straight line in which

4   each point of said second partial straight line has a second horizontal coordinate value;

5   wherein the difference between said first horizontal coordinate value and said

6   second horizontal coordinate value is a pixel;

7   wherein the smallest vertical coordinate of said second partial straight line is one

8   pixel larger than the largest vertical coordinate of said first partial straight line; and

9   wherein said shading range is adjacent to said first partial straight line in a

10   horizontal direction and is adjacent to said second partial straight line in a vertical

11   direction.

1 17. The image processing method as claimed in claim 15,

2 wherein a first partial straight line in which each point of said first partial straight

3 line has a first vertical coordinate value and a second partial straight line in which each

4 point of said second partial straight line has a second vertical coordinate value;

5 wherein the difference between said first vertical coordinate value and said

6 second vertical coordinate value is a pixel;

7 wherein the smallest horizontal coordinate of said second partial straight line is

8 one pixel larger than the largest horizontal coordinate of said first partial straight line;

9 and

10 wherein said shading range is produced so that said shading range is adjacent

11 to said first partial straight line in the vertical direction and is adjacent to said second

12 partial straight line in the horizontal direction.

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